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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,458	09/26/2006	Hideki Sato	129546	9288

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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
VINH, LAN	
ART UNIT	PAPER NUMBER
1792	
MAIL DATE	DELIVERY MODE
02/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,458	SATO, HIDEKI	
	Examiner	Art Unit	
	LAN VINH	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *092606*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 5, 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Engeler (US 3,558,375)

Engeler discloses a method of fabricating semiconductor structure. The method comprises:

etching a surface of the silicon wafer by immersing the wafer in an etching solution, the etching solution comprises 160 cc acetic acid, iodine, 280 cc nitric and 50 cc HF (col 6, lines 37-40, col 7, lines 21-25), which reads on the etching solution is a mixture of hydrofluoric acid, nitric acid, acetic acid and water further including iodine or iodide, in which a volume ratio of nitric acid in the etching solution is the largest among volume ratios of hydrofluoric acid, nitric acid, acetic acid and water, observing etched patterns on the surface of the wafer (col 6, lines 28-32), which reads on observing etch pits formed on the etched surface of the wafer, the silicon wafer has electrical resistivity of about 0.05 ohm-cm (col 6, lines 1-5), which reads on the claimed resistivity of 1ohm-cm or less. Since Engeler discloses etching the same material (silicon) using the same etching solution as the claimed invention under the theory of inherency, Engeler etching solution would have inherently had an etching rate of 100 nm/min or less for the silicon

wafer/ Engeler etching solution would have inherently removed an amount of 50 nm or more of the surface of the silicon wafer

2. Claims 5, 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Tiemann et al (US 3,772,102)

Tiemann discloses a method for transferring a desired pattern in silicon to a substrate layer. The method comprise:

etching a surface of the silicon wafer by immersing the wafer in an etching solution, the etching solution comprises 3 parts acetic acid, iodine, 5 parts nitric and 3 parts HF (col 3, lines 59-67; col 4, lines 1-5), which reads on the etching solution is a mixture of hydrofluoric acid, nitric acid, acetic acid and water further including iodine or iodide, in which a volume ratio of nitric acid in the etching solution is the largest among volume ratios of hydrofluoric acid, nitric acid, acetic acid and water, observing etched patterns on the surface of the wafer (col 4, lines 19-25), which reads on observing etch pits formed on the etched surface of the wafer, the silicon wafer is in crystalline form (col 3, lines 25-30), which reads on the silicon wafer has electrical resistivity of 1 ohm.cm oe less since the applicants discloses in page 11 of the instant specification that silicon single crystal wafer has electrical resistivity of 0.01-1 ohm.cm. Since Tiermann discloses etching the same material (silicon) using the same etching solution as the claimed invention under the theory of inherency, Tiermann etching solution would have inherently had an etching rate of 100 nm/min or less for the silicon wafer/ Tiermann

etching solution would have inherently removed an amount of 50 nm or more of the surface of the silicon wafer

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gantley (US 3,960,623) in view of Seki et al (US 5,409,569)

Gantley discloses a semiconductor etching method. The method comprises etching a surface of the silicon wafer by immersing the wafer in an etching solution, the etching solution comprises acetic acid, iodine, nitric and HF (col 3, lines 49-65), which reads on the etching solution is a mixture of hydrofluoric acid, nitric acid, acetic acid and water further including iodine or iodide, observing etched portions of a semiconductor bodied (col 4, lines 10-14), which reads on observing etch pits formed on the etched surface of the wafer, the silicon wafer is in crystalline form (col 2, lines 50-53), which reads on the silicon wafer has electrical resistivity of 1 ohm.cm or less since the applicants discloses in page 11 of the instant specification that silicon single crystal wafer has electrical resistivity of 0.01-1 ohm.cm. Unlike the instant claimed inventions as per claims 5-12, Gantley fails to specifically discloses that a volume ratio of nitric acid in the etching solution is the largest among volume ratios of hydrofluoric acid, nitric acid,

acetic acid and water/ the etching solution includes hydrofluoric acid : nitric acid : acetic acid : water in a volume ratio of 1 : 13-17 : 4-8 : 4-8/ the etching solution includes iodine or iodide in a range from 0.01 g to 0.09 g per 1 liter of total liquid volume of the etching solution and the removal amount of the surface of the silicon wafer by etching/silicon etching rate is 50 nm or more/100 nm/min.

Seki, in a semiconductor manufacturing method, discloses using an etching solution comprises HF, nitric acid, acetic acid, the concentration of the acids vary, iodine containing etchant requires nitric acid of higher concentration (col 2, lines 20-50) , changing the concentration of HF and iodine in the etching solution to effect the etch rate of silicon (col 6, lines 10-20). Thus, Seki serves as an evidence that changing the concentration of the elements of the etching solution/parameters according to the material being etched appears to reflect a result-effective variable. One skilled in the art at the time the invention was made would have found it obvious to vary the concentration of the acids, iodine in Gantley etching solution by conducting routine experimentation in order to achieve any desirable etching rates including the claimed rates because it is noted that result-effective variable can be optimized MPEP 2144.05 IIB

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is (571)272-1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lan Vinh/
Primary Examiner, Art Unit 1792

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